Claims

1. A method of producing a film of an yttria-alumina complex oxide, the method comprising the step of:

spraying a mixed powder of powdery materials of yttria and alumina onto a substrate to produce a sprayed film composed of an yttria-alumina complex oxide.

2. The method of claim 1, wherein said powdery material of yttria has a 50 percent mean particle diameter of not smaller than 0.1 μm and not larger than 100 μm.

3. The method of claim 1, wherein said powdery material of alumina has a 50 percent mean particle diameter of not smaller than 0.1 μm and not larger than 100 μm.

4. The method of claim 1, comprising the step of subjecting said sprayed film to a heat treatment.

5. The method of claim 1, wherein said yttria-alumina complex oxide includes at least garnet phase.

6. A film of an yttria-alumina complex oxide, obtained by the method of claim 1.

7. The film of claim 6 free from a crack having a length of not smaller than 3 μm and a width of not smaller than 0.1 μm.

8. The film of claim 6, wherein said yttria-alumina complex oxide comprises those of garnet and perovskite phases and a ratio YAL(420)/YAG(420) is not lower than 0.05 and not higher than 1.5, provided that said ratio YAL(420)/YAG(420) is the ratio of a peak strength YAL (420) of the (420) plane of said perovskite phase to a

peak strength YAG (420) of the (420) plane of said garnet phase, said peak strengths being measured by X-ray diffraction method.

9. A member effective for reducing particle generation and comprising a substrate and a surface layer on said substrate, wherein said surface layer has α calculated according to the following formula of not lower than 50 and not higher than 700, wherein α = (a specific surface area measured by Krypton adsorption method (cm^2/g)) × (a thickness of said surface layer (cm)) × (a bulk density of said surface layer (g/cm^3)).

10. The member of claim 9, wherein said surface layer has an open porosity of not lower than 10 volume percent and not higher than 30 volume percent.

11. The member of claim 9, wherein said surface layer has a ratio of an open porosity to a closed porosity (open porosity/closed porosity) of not higher than 10.

12. The member of claim 9, wherein said surface layer has a pore diameter of main open pores of 0.05 to 50 μm.

13. The member of claim 9, wherein said surface layer has a thickness of not smaller than 50 μm.

14. The member of claim 9, wherein said surface layer is made of a material selected from the group consisting of an oxide containing a rare earth element, an oxide containing an alkaline earth element, a carbide, a nitride, a fluoride, a chloride, an alloy, a solid solution thereof and a mixture thereof.

15. The member of claim 9, wherein said surface layer is made of a compound containing yttrium.

16. The member of claim 15, wherein said surface layer contains an yttria-alumina complex oxide.

17. The member of claim 9, wherein said member is to be exposed to a corrosive substance and a material constituting said substrate has an etching rate against said corrosive substance larger than that of a material constituting said surface layer.

18. The member of claim 17, wherein said corrosive substance is a halogen gas or a plasma of a halogen gas.

19. The substrate of claim 9, wherein said substrate is made of a material selected from the group consisting of alumina, spinel, yttria, zirconia and the complex oxide thereof.

20. The member of claim 15, wherein said surface layer is a film made of an yttria-alumina complex oxide, said film being formed by spraying a mixed powder of powdery materials of yttria and alumina on said substrate.

21. The member of claim 20, wherein said powdery material of yttria has a 50 percent mean particle diameter of not smaller than 0.1 μm and not larger than 100 μm.

22. The member of claim 20, wherein said powdery material of alumina has a 50 percent mean particle diameter of not smaller than 0.1 μm and not larger than 100 μm.

23. The member of claim 20, wherein said film is thermally treated.

24. The member of claim 20, wherein said yttria-alumina complex oxide includes at least garnet phase.

25. The member of claim 24, wherein said yttria-alumina complex oxide comprises those of garnet and perovskite phases and a ratio YAL(420)/YAG(420) is not lower than 0.05 and not higher than 1.5, provided that said ratio YAL(420)/YAG(420) is the ratio of a peak strength YAL (420) of the (420) plane of said perovskite phase to a peak strength YAG (420) of the (420) plane of said garnet phase, said peak strengths being measured by X-ray diffraction method.